

Primary Objective

Develop a pathway for treating asthma that directs patient care from the Emergency Room through inpatient management to discharge.

Recommendations

1. Provide standardized dosing for Short Acting Beta Agonists (SABA), Anticholinergic Bronchodilators (ie Ipratropium Bromide), and Steroids.
2. Provide guidelines for when and how patients should be assessed during an asthma exacerbation.
3. Establish classes of severity and therapeutic interventions based on those classes.
4. Establish admission and discharge criteria.
5. Reduce unnecessary testing not routinely recommended for evaluation of an asthma exacerbation.
6. Provide guidelines for adjuvant/escalation therapy and evaluation for patients with incomplete responses to treatment.

Rationale (Safety, Quality, Cost, Delivery, Engagement, & Satisfaction)

- **Safety:** Will be maintained by close communication between the ED providers, RNs, and Inpatient providers, especially when a patient is categorized as severe.
- **Quality:** Will be improved by instituting consistent terminology, dosing, and care between providers.
 - A pathway will also reinforce that all Children's providers deliver care based on the NHLBI guidelines and send a consistent message to patient, families, and outside providers.
 - "Multidisciplinary clinical pathways for asthma appear to be effective in reducing hospital length of stay and inpatient costs" (NHLBI p385; Banasiak and Meadows-Oliver 2004).
- **Cost:** Will be reduced by decreasing hospitalization rates and reducing time spent in the ED prior to admission.
 - We will reduce length of stay by providing steroids early and having set criteria for advancing patients on their treatments.
- **Delivery:** Will be improved by expediting patient flow through the Emergency Department to the Inpatient floor for providers, RNs and RTs.
 - RN administration of oral steroids after triage and use of double dosing of Ipratropium Bromide (IB) with triple dosing of albuterol has been shown to reduce hospitalization rates and length of time spent in the ED.
 - Provider assessment within one hour after initial inhaled treatment is also anticipated to reduce length of time spent in the ED.
 - Developing discharge criteria may reduce length of stay in the hospital.
 - Education will be incorporated throughout the patient's stay and will be consistent. We will teach families how to follow asn Asthma Action Plan and how to use an MDI with spacer.

- **Engagement:** Is created and supported by the involvement of a multidisciplinary team in the development and maintenance of the pathway, which includes MDs, RTs, RNs, and pharmacy staff.
 - As the pathway expands, it is anticipated that there will be a role for social workers and case managers to also become involved.
- **Patient/Family Satisfaction:** Shall be improved by providing the highest quality care based on established guidelines and the latest evidence available in the literature.
 - It is anticipated that the number of return visits to the ED will be reduced by institution of this pathway. This will increase family, as well as Primary Care Provider, satisfaction.
 - Staff satisfaction will be addressed through a survey before and after the initiation of the pathway so we may continue to improve our communication between departments.

Implementation Items

- ED and Inpatient Algorithms
- ED and Inpatient Order Sets
- Asthma Pathway Training Module for ED nurses
- Asthma Pathway Training Session for RTs
- Asthma Pathway Training for residents
- Asthma Pathway Introduction Grand Rounds
- Staff Satisfaction Survey
- Asthma History Tool for admission
- M-PACT Screening Tool for the ED
- Stepwise Approach to Managing Asthma
- Asthma, Allergy & Pulmonology Referral List

Metrics Plan

- To assess medical staff satisfaction with asthma care at Children's before and after implementation of the pathway via survey.
- To examine the effect of the quality and efficiency of care in the ED before and after the implementation of the pathway through an IRB approved research protocol.

APC Plan

- To continue to meet every 1-2 months through the first year of implementation of the pathway to monitor our effectiveness in teaching the pathway, utilizing it, and adapting it to our hospital.
- After the first year, we anticipate developing the pathway further to include recommendations for Asthma Action Plans and bridging patients better from the point of care at Children's back to their medical home.

Evidence

General

1. National Heart, Lung, and Blood Institute Expert Panel Report 3 (EPR3): Guidelines for the Diagnosis and Management of Asthma; 2007.

Role of Clinical Care Pathways

2. Wazeka A, Valacer DJ, Cooper M, Caplan DW, DiMaio M. Impact of pediatric asthma clinical pathway on hospital cost and length of stay. *Pediatr Pulmonol* 2001 Sep; 32(3):211-6
3. Johnson KB, Blaisdell CJ, Walker A, Eggleston P. Effectiveness of a clinical pathway for inpatient asthma management. *Pediatrics* 2000 Nov; 106(5): 1006-12.
4. Kelly CS, Andersen CL, Pestian JP, Wenger AD, Finch AB, Strope GL, Luckstead EF. Improved outcomes for hospitalized asthmatic children using a clinical pathway. *Ann Allergy Asthma Immunol.* 2000 May; 84(5) 509-16.
5. McDowell KM, Chatburn RL, Myers TR, O'Riordan MA, Kercksmar CM. A cost-saving algorithm for children hospitalized for status asthmaticus. *Arch Pediatr Adolesc Med.* 1998 Oct; 152(10): 977-84.
6. Cunningham S, Logan C, Lockerbie L, Dunn MJ, McMurray A, Prescott RJ. Effect of an integrated care pathway on acute asthma/wheeze in children attending hospital: cluster randomized trial. *J Pediatr.* 2008 Mar; 152(3): 315-20.

Continuous Albuterol

7. Camargo CA, Rowe, BH. Continuous versus intermittent beta-agonists for acute asthma (Cochrane Review). *The Cochrane Library, Volume (2) 2004.*
8. Rodrigo G, Rodrigo C. Continuous versus intermittent B-agonists in the treatment of acute severe asthma: A systematic review with meta-analysis. *Chest* 2002; 122:160-165.
9. Reisner C, Kotch A, Dworkin G. Continuous versus frequent intermittent nebulization of albuterol in acute asthma: a randomized, prospective study. *Ann Allergy Asthma Immunol.* 1995 Jul;75(1): 41-7.
10. Papo MC, Frank J, Thompson AE. A prospective, randomized study of continuous versus intermittent nebulized albuterol for severe status asthmaticus in children. *Crit Care Med* 1993 Oct;21(10):1479-86.
11. Khine H, Fuchs SM, Saville AL. Continuous vs intermittent nebulized albuterol for emergency management of asthma. *Acad Emerg Med* 1996 Nov;3(11):1019-24.

Ipratropium Bromide

12. Dotson et al. Ipratropium Bromide for Acute Asthma Exacerbations in the Emergency Setting. *Pediatr Emer Care* 2009;25:687-695.
13. Schuh et al. Efficacy of nebulized ipratropium bromide added to frequent high-dose albuterol therapy in severe childhood asthma. *J Pediatr* 1995;126(4):639-645
14. Qureshi et al. Efficacy of nebulized ipratropium bromide in severely asthmatic children. *Ann Emerg Med* 1997;29(2):205-211
15. Qureshi et al. Efficacy of nebulized ipratropium on the hospitalization rates of children asthma. *N Engl J Med* 1998;339(15):1030-1035.
16. Zorc et al. Ipratropium Bromide Added to Asthma Treatment in the Pediatric Emergency Department. *Pediatrics* 1999;103:748-752.
17. Craven D, Kerckmar CM, Myers TR, O'Riordan MA, Golonka G, Moore S. Ipratropium Bromide plus nebulized albuterol for the treatment of hospitalized children with acute asthma. *J Pediatr* 2001. 138(1): 51-58.
18. Fitzgerald JM, Grunfeld MB, Pare P, Levy RD, Newhouse MT, Hodder R, Chapman KR. The clinical efficacy of combination nebulized anticholinergic and adrenergic bronchodilators vs. nebulized adrenergic bronchodilator alone in acute asthma. *Chest* 1997. 111(2): 311-5.
19. Goggin et al. Randomized Trial of the Addition of Ipratropium Bromide to Albuterol and Corticosteroid Therapy in Children Hospitalized Because of an Acute Asthma Exacerbation. *Arch Pediatr Adolesc Med.* 2001;155:1329-1334.

Corticosteroids

20. Hendeles L. Selecting a systemic corticosteroid for acute asthma in young children. *J Pediatr* 2003; 142:540-4.
21. Becker JM, Arora A, Scarfone RJ, Spector ND, Fontana-Penn ME, Gracely E, Joffe MD, Goldsmith DP, Malatack JJ. Oral versus intravenous corticosteroids in children hospitalized with asthma. *J Allergy Clin Immunol.* 1999 Apr;103(4): 586-90.

Magnesium Sulfate

22. Ciarallo L, Brousseau D, Reinert S. Higher-dose intravenous magnesium therapy for children with moderate to severe acute asthma. *Arch Pediatr Adolesc Med.* 2000; 154: 979-83.
23. Silverman RA, Osborn H, Runge J, Gallagher EJ, Chiang W, Feldman J, Gaeta T, Freeman K, Levin B, Mancherje N, Scharf S; Acute Asthma/Magnesium Study Group. IV Magnesium sulfate in the treatment of acute severe asthma: a multicenter randomized controlled trial. *Chest.* 2002 Aug; 122(2) 489-97. Erratum in: *Chest* 2002 Nov; 122(5): 1870.

Controllers

24. Sampayo E, Chew A, Zorc J. Make an M-PACT on Asthma; Rapid Identification of Persistent Asthma Symptoms in a Pediatric Emergency Department. *Pediatric Emergency Care & Volume 26, Number 1, January 2010.*
25. "Key Points for Asthma Guideline Implementation" from the Medical Home Chapter Champions Program on Asthma; 2013.

Other Institutional Pathways

26. Children's Hospital of Philadelphia ED Pathway for Evaluation/Treatment of Children with Asthma and Inpatient Asthma Practice Pathway, Revised September 2013.
Authors: J. Zorc MD, R. Scarfone MD, AM Reardon CRNP, N. Stroebe CRNP, W. Frankenberger RN, L. Tyler RT, D. Simpkins RT
27. Asthma Clinical Care Guideline for Children's Hospital/Kaiser/Denver Health, 2009
28. University of Rochester Medical Center Pediatric Asthma Clinical Care Pathway
4/1/13
29. Seattle Children's Asthma 3.0 Executive Summary 12/7/12

The Asthma Clinical Care Pathway

Inclusion Criteria

1. Children 2 years and older who present to the Emergency Department (ED) or are directly admitted to the inpatient floor with a primary problem of asthma exacerbation.
2. Children 1-2 years of age may be also included, after evaluation by an attending physician, as long as they do not fit any exclusion criteria.

Exclusion Criteria

1. Children with a chronic pulmonary or cardiac condition other than asthma (such as Bronchopulmonary Dysplasia/Chronic Lung Disease, Cystic Fibrosis, Airway anomalies) or who have a neuromuscular disorder.
2. Children currently being treated for bronchiolitis, viral pneumonitis, aspiration pneumonia, or croup.

Definitions

- Patients will be divided into “Mild,” “Moderate,” and “Severe” categories, similar to the NHLBI guidelines. We have developed a pathway that will expedite treatment and standardize our assessments. Patients will be placed in one of the above categories based on their Clinical Respiratory Score and Provider assessment.
- “Mild” patients will be defined as those who have a CRS ≤ 4 which equates to a child who has a few of the following: retractions in less than 2 muscle groups, good to fair air entry, mild or only expiratory wheeze, may have mild hypoxia and a mild elevation in respiratory rate.
- “Moderate” patient will be defined as CRS 5-7, which equates to a child who has all of the above symptoms \pm a few more severe symptoms: retractions in 2 muscle groups, fair to diminished air entry, full expiratory wheeze and may have some inspiratory wheeze, is likely hypoxic, and may be anxious.
- “Severe” patients will be defined as CRS ≥ 8 , which describes a child who is clearly in distress and needs immediate attention. This child has all of the moderate symptoms described above and may have a few more severe symptoms, such as lethargy, intercostal retractions, absent air entry or inspiratory and expiratory wheezes in all lung fields.
- Respiratory Therapists (and Nurses in the ED) will assess patients and assign their CRS scores. A patient can be initially placed on a higher position on the pathway if the provider (i.e. physician) believes that the patient is more ill than their CRS implies, or if they are borderline on their score. The Asthma Pathway Committee will keep track of patients who are treated this way in order to have on-going assessments of our CRS system and how our RTs are assessing patients. If there is

still a discrepancy between the provider and RT assessment at the time of the second treatment, then the patient will need to be taken off the pathway and can be treated as the provider chooses.

ED Pathway (Refer to Algorithm 1)

Objectives:

- Early identification of asthma exacerbations by triage nurses and respiratory therapists
- Nurse-initiated, CRS-driven pathway with standardized treatments with timely assessments
- Utilize consistent dosing and treatment frequency
- Provide guidelines for use of steroids early in the ED course
- Provide guidelines for admission to either the inpatient floor, IMC, or PICU
- Initiate a pathway of treatment that will follow the patient through their stay (except for the PICU), that will also convey a consistent message of how we treat asthma to nursing, RT, inpatient and outpatient providers, and especially to patients and their families

Intake:

- We will follow the NHLBI guidelines for asthma exacerbations, including immediate initiation of treatment (steroids and SABA) for those having a moderate, severe, or life-threatening exacerbation based on a brief history and physical assessment.
- Triage nurses will perform the brief history and physical exam and inform RT and the ED provider when there is a patient with a severe exacerbation.
- The Brief History
 - Identify that patient has a history of asthma, “reactive airway disease,” or more than two prior episodes of cough/wheeze that have been responsive to albuterol.
 - Time of onset and potential triggers for current exacerbation
 - Severity of symptoms (and comparison to prior exacerbations) and response to any treatments given prior to arrival
 - Current medications and time of last dose
 - Estimated number of office visits, ED visits and hospitalizations for asthma symptoms, especially in last year
 - Prior episodes of respiratory insufficiency (altered consciousness, PICU admissions, intubations)
 - Potential complicating illnesses: other pulmonary or cardiac disease, or illnesses aggravated by steroids (diabetes, peptic ulcer, hypertension or psychosis)
- The Brief Physical Exam
 - Assess the Clinical Respiratory Score, including level of consciousness, presence of cyanosis, and respiratory distress.
 - Perform quick assessment of fluid status and patient’s ability to tolerate oral medications.

- Identify possible complications (pneumonia, pneumothorax, or pneumomediastinum).
- Rule out upper airway obstruction. If the child is between 1 and 2 years of age, assess for signs of bronchiolitis and discuss with provider.
- A more detailed history and physical exam will follow after initial therapy has been completed. Laboratory and/or imaging studies are not required for these patients, but will be considered after the initial therapy has been completed and will not delay initiation of treatment.
- For children who are mild-moderate and old enough to perform objective lung function testing will have a PEF performed on arrival and 30-60 minutes after the initial treatment.

Treatment:

- Initial treatment will include an SABA (for all patients), two doses of IB (for moderate-severe patients), and systemic corticosteroids for most. Oxygen will be provided for patients with $SpO_2 \leq 90\%$.
- RT will provide respiratory treatments; nursing will be trained on how to give these treatments if RT is delayed or unavailable
- Our goal is to have nursing provide the first steroid dose immediately after the patient has been triaged and at the start of their first inhaled treatment for all moderate-severe patients. Mild patients may require systemic steroids, especially if they have incomplete response to a SABA in the ED.
- Adding multiple doses (2-3) of IB to a selective SABA produces additional bronchodilation, resulting in fewer hospitalizations, in the ED setting (Evidence A from the NHLBI guidelines. Plotnick and Ducharme 2000; Rodrigo and Castro-Rodriguez 2005; Qureshi 1997; Qureshi 1998; Schuh 1995; Zorc 1999). We have selected a double dose based on Qureshi 1998. The combination of 3 doses of albuterol with 2 doses of ipratropium bromide may be referred to as a “Unineb.”
- For severe patients, adjunctive magnesium sulfate (with a normal saline bolus) will be considered.
- Repetitive administration of SABAs produces incremental bronchodilation. By providing these three doses as part of a large nebulized treatment, we will insure that patients receive those doses in a timely manner and make our RTs available to treat more patients. As 60-70% of patients have sufficient response to this type of initial treatment to be discharged, we will make this standard therapy for any patient presenting with a moderate-severe exacerbation and reassess their response one hour after treatment (NHLBI p393).
- All patients who receive a “Unineb” will be re-assessed within 60 minutes of the completion of their treatment. Response to this initial treatment has been shown to be a better predictor of the need for hospitalization than the initial presentation (Evidence A, NHLBI guidelines p396; Kelly et al. 2004). If patients have had good response and are “mild,” they will be discharged unless they continue to be hypoxic

or have a concurrent issue necessitating admission. If the patient remains moderate-severe, they will be continued on scheduled albuterol according to their severity level and be admitted to the appropriate location (see Pathway Algorithm).

- Serial pulse oximetry measurements will be assessed to help determine response to therapy and need for admission along with clinical improvement and CRS. An initial spot pulse oximetry is useful for assessing exacerbation severity, but not for predicting need for hospitalization (Keahey et al 2002; Kelly et al 2004; Keogh et al 2001; Sole et al 1999, Wright et al 1997; NHLBI guidelines p.379). A repeat pulse oximetry of $<92\%$ 60 minutes after initial therapy is a better predictor (Kelly et al. 2004; Sole et al. 1999; Wright et al. 1997; NHLBI guidelines p.379).
- We will attempt to make admit decisions within 4 hours based on the patient's reassessment and need for repeat albuterol after their steroid dose and initial SABA (\pm IB) treatment (see Pathway Algorithm).
- Studies have shown that initiating an ICS at ED discharge can have a significant reduction in the risk of subsequent ED visits or relapse events (Sin and Man 2002; Rowe et al. 1999). Patients who are not on long-term control therapy will be evaluated for whether it is indicated by utilizing the M-PACT screening tool. Patients who may benefit from an ICS will be requested to follow with their PCP or be referred to either Pulmonology or an Allergy & Asthma group for further evaluation. (ref: M-PACT Study and referral list). ED provider may also consider prescribing a 1-2 month supply of an ICS at discharge to bridge the gap to primary care. All patients discharged from the ED will be asked to follow with their PCP within 5-7 days and a Pulmonologist or Asthma & Allergy specialist in 1-4 weeks if indicated.
- Patient and family education will be performed with RT prior to discharge, which will include how to use an MDI with spacer and possibly a peak flow meter.

Dosing:

- Dosage recommendations for Albuterol are 0.15mg/kg (min dose 2.5mg) every 20 mins x 3 doses. We will combine these three doses into a larger nebulized dose and combine with ipratropium bromide:
 - $2.5\text{mg} \times 3 = 7.5\text{mg}$ for children $<10\text{kg}$
 - $5\text{mg} \times 3 = 15\text{mg}$ for children $\geq 10\text{kg}$
- Thereafter patients will be switched to 4-8 puffs via MDI with spacer, unless they require continuous albuterol or difficulty handling MDI administration. This will reinforce that MDIs are equally effective to nebulized treatments and allow RT to begin MDI teaching
- Ipratropium Bromide dosing is recommended as 0.25-0.5mg every 20 minutes for 3 doses and may be mixed with albuterol in the same nebulizer. We will combine two doses of IB with the 3 doses of albuterol as follows:
 - $0.25\text{mg} \times 2 = 0.5\text{mg}$ for children $<10\text{kg}$
 - $0.5\text{mg} \times 2 = 1\text{mg}$ for children $\geq 10\text{kg}$

- We will continue to follow the recommendations for 1-2mg of Prednisone (max = 60mg/day) by starting with a 2mg/kg “burst” in the ED. There is no known advantage to intravenous administration over oral therapy, therefore we will provide oral Prednisone unless the patient is working too hard to swallow the medication or is vomiting (NHLBI p387).

Inpatient Pathway (Refer to Algorithm 2)

Objectives:

- Provide expedient care to direct admissions that are consistent with ED practices when patients arrive from a primary care office or Urgent Care setting.
- Provide continuity of care from the Children’s Emergency Department
- Routinely assess patients and advance their treatment when the patient is improving, regardless of time of day.
- Enhance communication between RTs, RNs, and MDs.
- Develop a complete Asthma History Tool to provide consistent and thorough evaluation of a patient’s asthma and allergy history at the time of admission.

Admission:

- Upon arrival on the floor, the patient will be assessed by a physician and a respiratory therapist. The RT will assign a CRS and the Physician Team will select which protocol to start the patient on: “Severe,” “Moderate,” or “Mild.” RTs will continue treatments scheduled from the ED until a pathway is selected and then will follow the Inpatient Pathway once ordered (See Algorithm 2).
- The Physician Team will use the EPIC order sets to place where a patient begins on the pathway. If the team does not want to use the dosing or schedule built in to pathway, then the patient will not be placed on the pathway and the order set should not be used.
- All patients will have a full Asthma history obtained on admission using the Asthma History Tool. Based on the patient’s history, all patients will be evaluated as to whether they are on a proper controller medication.
- RTs and the physician team will continue to assess patients based on they place in the pathway. When a patient is deemed ready to advance on the pathway, the RT will inform the physician team who will be expected to assess the patient and advance their orders in a timely fashion (within 30-60 minutes).
- If a patient is not responding to their treatments, the physician team should be notified by RT and/or nursing. Adjunctive therapy should be considered, or the patient should be escalated on the pathway. Patients who are not responsive and are “severe” will be considered for transfer to the PICU if they have worsening mental status, increasing oxygen requirements, or not responsive to adjuvant therapy.
- Throughout the patient’s hospital stay, RT will work on asthma teaching with the family, including how to effectively use an MDI with a spacer. At discharge, an

Asthma Pathway Committee Executive Summary



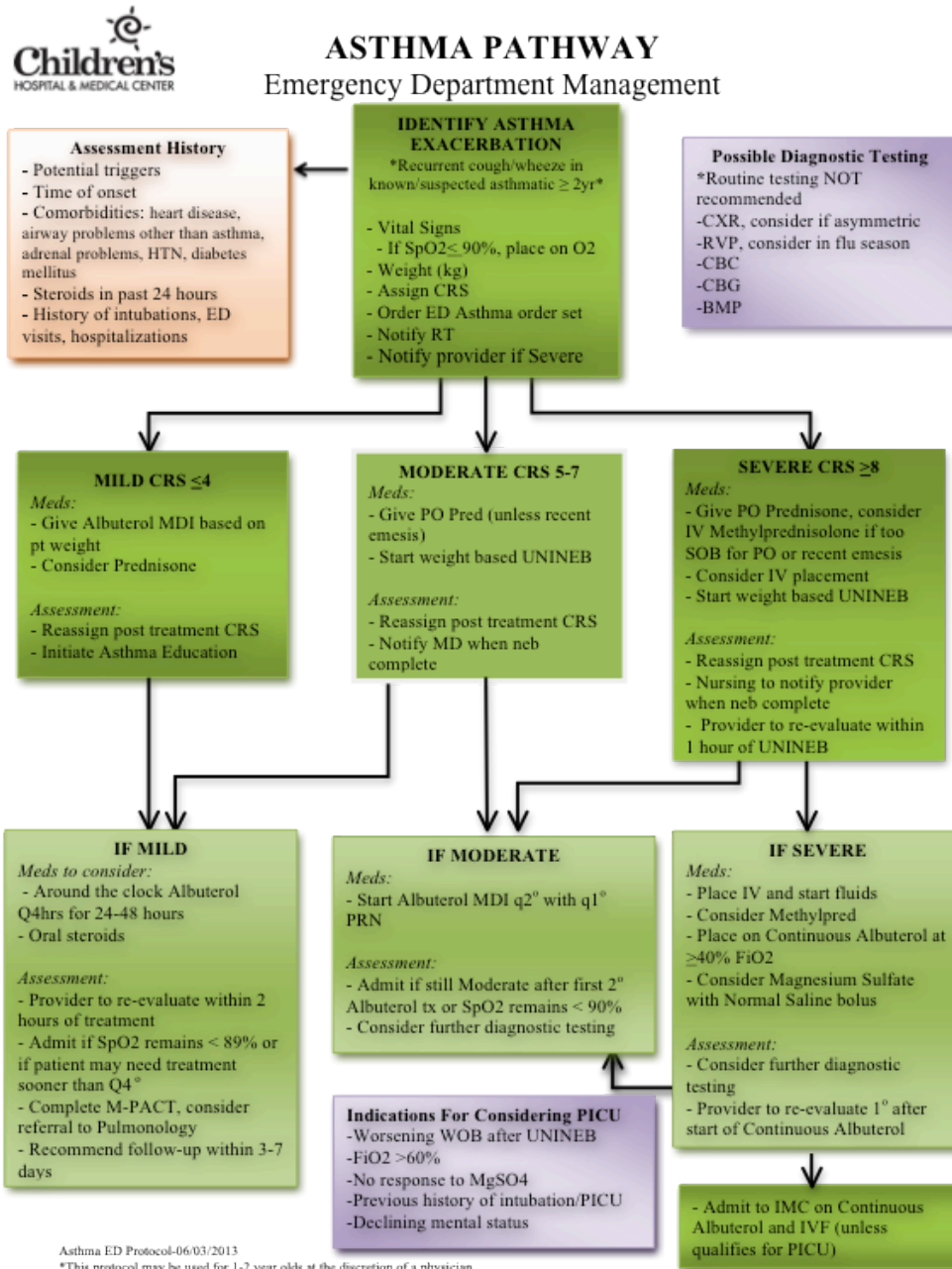
We know children.

Asthma Action Plan will be created for all patients by the physician team and taught to the family by RT.

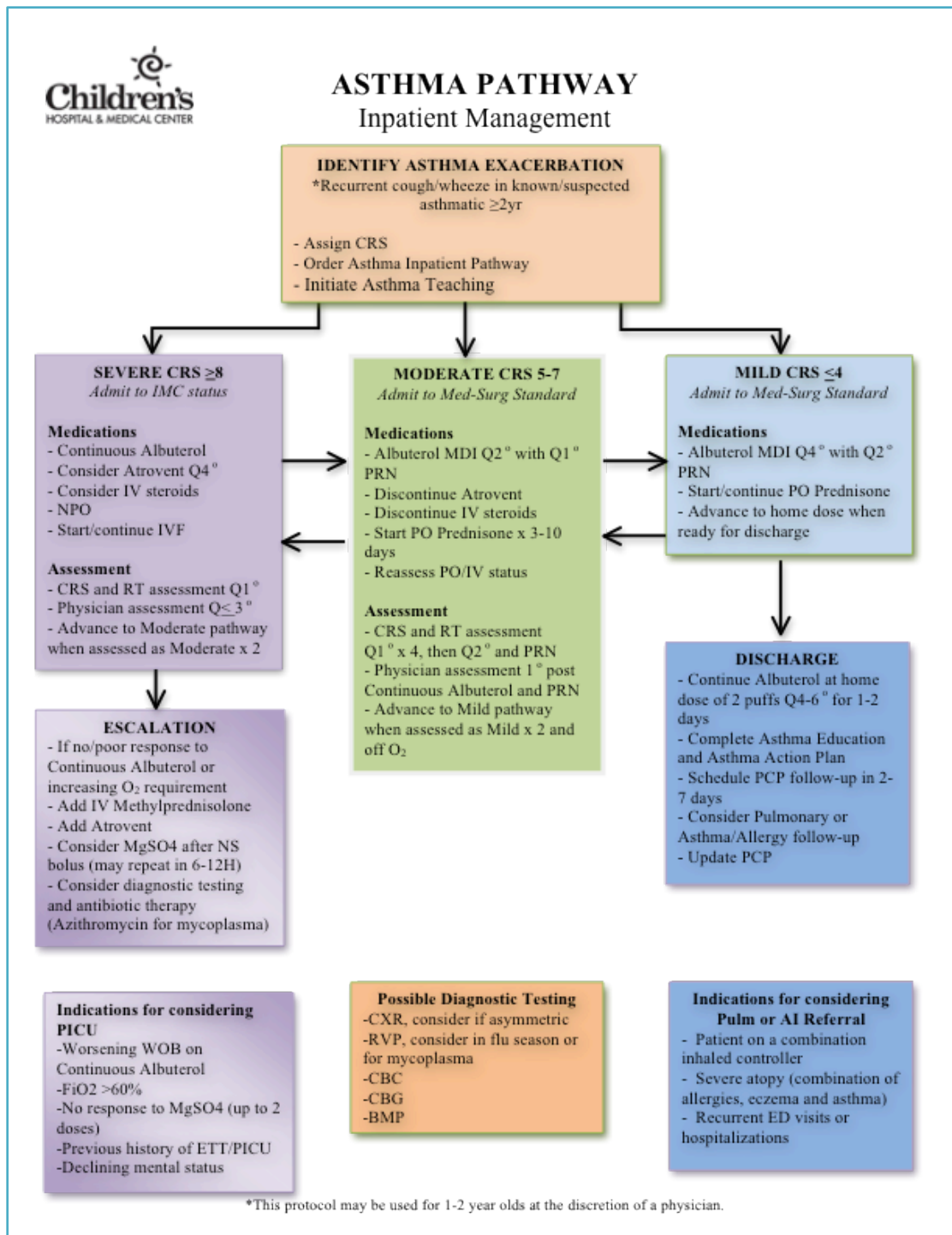
Dosing:

- Will be consistent with what is provided in the ED and within NHLBI guidelines.
- Atrovent will be available as adjuvant therapy for severe patients for the first 24 hours as 250mcg via neb Q4 hours.
- Albuterol will be given either continuously, Q2hrs or Q4hrs based on the patient's place on the pathway. Albuterol will be given via MDI unless the patient is on continuous or not tolerating MDI treatments (i.e. anxious toddler who is more calm with nebulizers). Dosing will be based on weight below or above 10kg:
 - <10kg:
 - Mild: 4 puffs Q4 hours
 - Moderate: 4 puffs Q2hours
 - Severe: 0.5mg/kg/hr Continuous
 - ≥ 10kg:
 - Mild: 8 puffs Q4 hours
 - Moderate: 8 puffs Q2 hours
 - Severe: 0.5mg/kg/hr Continuous
- Prior to discharge, the patient will be reduced to home dosing of Albuterol (2-4 puffs) and assessed 4-6 hours later to insure they tolerate the lower dose.

Algorithm 1



Algorithm 2



Asthma History Tool

Current Presentation:

Date/Time of symptom Onset: ***

Symptoms Included: [***] Cough [***] Wheezing [***] Shortness of Breath [***] Fever

Treatments Given at Home: ***

ED Course: ***

Asthma History

Prior Diagnosis of Asthma: ***

Last Course of Steroids: ***

Number of Courses of Steroids in Past Year: ***

ED/PCP Visits for Asthma in Past Year: ***

Asthma Admissions in Past Year: ***

Ever in ICU or Intubated: ***

Asthma Medications

Asthma Rescue Medications: ***

Actual Use of Albuterol (more than 2x/wk, 1-2x/wk, Only with Exercise): ***

Asthma Controller Medications: ***

Actual Use of Controller: ***

Allergy Medications: ***

Asthma Action Plan at home? ***

Triggers/Symptoms

Use Peak Flow Measurements at Home: ***

Triggers: ***

Environmental History (smokers, pets, mold, rodents): ***

How often do the following symptoms occur? (2x/month, <2x/wk, >2x/wk, daily, always)

Daytime cough/wheeze: ***

Nighttime cough/wheeze: ***

Cough/wheeze with activity: ***

Allergy symptoms: ***

Who Provides your asthma care (PCP or specialist): ***

Severity Classification (place an X in front):

Intermittent

Mild Persistent

Moderate Persistent

Severe Persistent

M-PACT Screening Tool for the ED

Mini Pediatric Asthma Control Tool (M-PACT)

Please take time to fill out this checklist. This checklist can help doctors and nurses (and you!) to know how to best help your child manage his or her asthma.

- Children may have different *signs* of asthma.
- Signs of asthma get worse during an asthma *flare* (also known as an attack or exacerbation)

What are the signs of asthma for your child? (check all that apply)

<input type="checkbox"/> Coughs	<input type="checkbox"/> Wheezes (a whistling in the chest)
<input type="checkbox"/> Gets mucus in his or her chest	<input type="checkbox"/> Gets short of breath
<input type="checkbox"/> Feels chest pain or tightness	<input type="checkbox"/> Breathes fast

Think about the past 3 months

- How often did these things happen when your child was feeling his or her best and not having an asthma flare? (check one)

	Never	Once or twice a month	Once or twice a week	Every other day	Every day	More than once a day
1. Asthma symptoms with running or sports						
2. Asthma symptoms while asleep at night						
3. He or she needed to take albuterol or other quick-relief medicine for asthma symptoms						

Responses in the shaded area above indicate the presence of persistent asthma symptoms

*Adapted from Sampayo et al. 2010.

Stepwise Approach for Managing Asthma

Steps		Preferred treatment
Step 1		SABA prn
Step 2		Low dose ICS
Step 3		0-4 years: Medium dose ICS + subspecialist referral ≥5 years: Low dose ICS + LABA or medium dose ICS
Step 4		Medium dose ICS + LABA or montelukast + subspecialist referral
Step 5		High dose ICS + LABA or montelukast + subspecialist referral
Step 6		High dose ICS + LABA or montelukast + OCS + subspecialist referral

Table 1: Stepwise approach to managing asthma

Notes

- The stepwise approach is meant to assist—not replace—clinical decision making.
- Before step up, review adherence, inhaler technique, environmental control and comorbid conditions.
- If clear benefit is not observed within 4-6 weeks and/or technique and adherence is not satisfactory, consider adjusting therapy and/or alternative diagnoses.

Acronyms
SABA = Short acting beta agonist
LABA = Long acting beta agonist
ICS = Inhaled corticosteroid
OCS = Oral corticosteroid
ED = emergency department

Components of severity	Intermittent	Persistent		
		Mild	Moderate	Severe
Symptoms	≤2 days/week	>2 days/week	Daily	Throughout the day
Nighttime awakenings	0 (≤4 years) ≤2x/month (≥5 years)	1-2x/month (≤4 years) 3-4x/month (≥5 years)	3-4x/month (≤4 years) >1x/week (≥5 years)	>1x/week (≤4 years) Often 7x/week (≥5 years)
SABA use for symptoms	≤2 days/week	>2 days/week	Daily	Several times per day
Impairment Limitation of normal activity	None	Minor	Some	Extreme
Lung function *	FEV1>80% FEV1/FVC>85% (5-11 years) FEV1/FVC normal (≥12 years)	FEV1>80% FEV1/FVC>85% (5-11 years) FEV1/FVC normal (≥12 years)	FEV1>60% FEV1/FVC>75% (5-11 years) FEV1/FVC reduced by 5% (≥12 years)	FEV1<60% FEV1/FVC<75% (5-11 years) FEV1/FVC reduced >5% (≥12 years)
Risk Exacerbations requiring OCS	0-1/year	≥2/6 months (0-4 years) ** ≥2/year (≥5 years)		
Recommended step for initiating therapy ***	Step 1	Step 2	Step 3	Step 3 (≤4 years) Step 3 or 4 (5-11 years) Step 4 or 5 (≥12 years)

Table 2: Classifying asthma severity and initiating therapy

Components of control	Well controlled	Not well controlled	Very poorly controlled
Symptoms	≤2 days/week	>2 days/week or (if ≤11 years) multiple times ≤2 days/week	Throughout the day
Nighttime awakenings	≤1x/month (if ≤12 years) ≤2x/month (if >12 years)	≥2x/month (if ≤12 years) 1-3x/week (if >12 years)	≥2x/week (if ≤12 years) ≥4x/week (if >12 years)
Impairment Interference with normal activity	None	Some limitation	Extremely limited
SABA use for symptoms	≤2 days/week	>2 days/week	Several times per day
Lung function *	FEV1>80% FEV1/FVC>80%	FEV1 60-80% FEV1/FVC 75-80%	FEV1<60% FEV1/FVC<75%
Risk Exacerbations requiring OCS	0-1x/year	2-3x/year (if 0-4 years) ≥2x/year (if ≥5 years)	≥3x/year (if 0-4 years) ≥2x/year (if ≥5 years)
Reduction in lung growth	Requires long-term follow-up		
Treatment related to adverse effects	Medication side effects do not correlate with specific levels of control, but should be considered in overall assessment of risk.		
Recommended action for treatment ****	Consider step down if well controlled for ≥3 months.	Step up 1 step. Re-evaluate in 2-6 weeks.	Consider short course oral corticosteroid. Step up 1-2 steps. Re-evaluate in 2 weeks.

Table 3: Assessing asthma control and adjusting therapy

* Some individuals with smaller lungs in relation to their height (such as a thin individual with narrow A-P diameter to their chest) may normally have FEV1<80% and/or FEV1/FVC<85%. Lung function measures should be correlated with clinical assessment of asthma severity.

** For 0-4 years, ≥4 wheezing episodes per year each lasting >1 day and risk factors for persistent asthma meets risk criteria for persistent asthma.

*** For initial therapy of moderate or severe persistent asthma that is poorly controlled, consider a short course of OCS.

**** Recommended guidelines

Spring 2013 (DOCS/NAAP)

*Adapted from “Key Points for Asthma Guideline Implementation”

Asthma, Allergy & Pulmonology Referral List

Your child may benefit from use of an inhaled controller for his/her asthma based on our screening today in the Children's Hospital & Medical Center Emergency Department. Please discuss with your primary care provider, or you may seek specialty care with one of the following providers:

Children's Hospital Asthma, Allergy & Pulmonology Clinic

8200 Dodge Street
Omaha, NE 68114
P: 402-955-5570 F: 402-955-5576

Midwest Allergy & Asthma

16945 Frances Street
Omaha, NE 68130
P: 402-397-7400 F: 402-397-0115

Boys Town Allergy, Asthma & Pediatric Pulmonary Clinics

1. Boys Town Medical Campus – Pacific Street Clinic
14080 Bows Town Hospital Road (139th & Pacific)
Boys Town, NE 68010
P: 402-778-6930 F: 402-778-6939
2. Lakeside Pediatric Clinic
16929 Frances Street, Suite 101
Omaha, NE 68130
P: 402-758-5125 F: 402-758-5283
3. 88th Street Pediatric Clinic
2801 South 88th Street
Omaha, NE 68124
P: 402-898-1528 F: 402-391-8991

Allergy, Asthma & Immunology Associates, P.C.

1. Omaha Clinic
2808 South 80th Ave, Suite 210
Omaha, NE 68124
P: 402-391-1800 F: 402-391-1563
2. Lincoln Clinic
600 North Cotner, Suite 208
Lincoln, NE 68505
P: 402-464-5969 F: 402-464-3657

Asthma Pathway Committee Executive Summary



We know children.

Team Members

Dr. Lauren Maskin, Rachel Shirk, RT, Britnee Hallett, RT, Kendra Christensen, RT, Dr. Tom Deegan, Trish Lade, RN, Kristi Kult RN, Dr. Luke Noronha, Dr. Casey Burg, Dr. Betsy Stephenson